Research Plan Proposal

Regional Disparity in Agricultural Development:

A District Level Analysis for the State of Rajasthan

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TABLE OF CONTENTS

Introduction……. 3

Literature Review…… 4

Objectives……..... 17

Hypotheses……... 17

Methodology…… 18

Bibliography……..... 22

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Introduction

For the overall development of a country like India, growth of agriculture sector is a prerequisite. As the development of this sector not only helps the large section of population dependant on it, but also affects the other sectors through forward and backward linkages. There are very few studies conducted to measure inter-district disparities in agriculture sector for the state of Rajasthan. Most of the studies conducted earlier, have taken state as a unit for measuring disparities. In India where some of the states are larger than many nations, there is need to conduct the study at disaggregate level. Rajasthan which is largest state of the country, these kinds of studies will help in identifying the factors responsible for disparities at regional level and thereof will help in developing policies accordingly. The present study is an attempt to analyse inter-district disparities in development of agriculture sector in the state of Rajasthan. Shown in studies conducted earlier, inter-district disparities in agriculture sector in the state have widened. Widening inter-district disparities in the state is not only resulting in its low growth, but also increasing dissatisfaction among the farmers of the less developed regions. The main objective of the present study is to account for the reasons of disparities at state and district level and to suggest the policy measures to achieve the target of 'Inclusive Growth'.

Review of Literature

There have been various studies in the field of agriculture. A few select studies pertaining to prospects and challenges in the agriculture sector have been reviewed here.

Rangarajan (1982) in his study analyzed the linkages between agriculture sector and Industrial sector in India. Three types of linkages, namely demand, production, saving and investment were discussed. The results of the report stated that one percent increase in agricultural output increases the industrial production by 0.5% and national income by 0.7%. The findings of the study corroborates the experiences of Indian economy in the 1980s and 1990s.The trend growth rate of 3.2% in agricultural production during the 1980s contributed to the growth in industrial production in the 1990s.

Eicher & Staalz (1998) in their book had taken in to account the recent developments in agriculture across the countries in the world. Lessons taken in the field of agriculture and rural development since 1950s in these countries have been discussed. Three questions related to development of agriculture in middle and low income countries have been addressed by authors. The questions were related to role of agriculture in national development strategies and how can the agrarian transformation be accelerated and how poverty can be reduced and more jobs can be generated by rural economic development. Constraints imposed by some factors like market failures, food insecurity, fiscally sustainable organizations, environmental degradation, income and asset inequality, rural poverty, the changing roles of the public and private sector in research, and input and output marketing systems has also been discussed. In order to restructure their basic economic institutions how different countries in the world fight with these

constraints and for this purpose four case studies (China, Indonesia, Colombia, and Sub-Saharan Africa) have been examined in this book.

Chand &Chauhan (1999) in their policy paper had shown regional disparities in term of per hectare agriculture productivity and income among various states since 1980-81.The study had witnessed widening gap between developed and underdeveloped, and, poor and rich states. Disparities in terms of per hectare productivity and per rural person NSDP in agriculture among major states (16 states) for different year had been calculated through co-efficient of variation. Results of the study showed that regional disparities in agriculture productivity have increased from 36% during 1980-81 to 1984-85 to 40% during the later half of 1980s and further increased to 43% during 1990s. Similar trend with higher magnitude had been shown in per person NSDP. Inequality in land man ratio was the reason stated in paper for these disparities and the study suggested that there is need for more vigorous efforts on technological, institutional and infrastructural fronts to raise productivity and to accelerate growth in agriculture sector.

Joshi (1999) in his book made a comparative analysis of growth of agricultural sector in India and that in developed countries. The findings of the book show that the production of wheat per hectare in Japan was three times more than that in India and the production of rice per hectare in Egypt was five times more than that in India and the production of cotton per hectare in U.S.A was five times more than that in India. Even today the Indian economy is dependent on agriculture and agriculture depends on monsoon. High rate of economic growth in India depends on agriculture .Similarly the failure of crops retards the rate of progress. The book suggested constant and concentrated attention is necessary in the economic policy in new areas for new crops and amongst new farmers where the effect of green revolution was not evident.

Ferroni, Kohli & Sood (2000) studied performance of agricultural sector in India over the past thirty years. Agriculture in India plays an important role in its overall development and dynamism. However, a lot needs to be done in this sector to sustain high economic growth of the nation. This book explores the future and put the audacious question: what could the agricultural sector in India look like 30 years from now and how should it look if it is to successfully meet the needs of the country's affluent society? A number of recommendations has been suggested in this book like public programs needed to be much more focused and effective; recognizing the importance of the scant factor water- long term constraint to India's agricultural growth and should be given top priority to significantly improving the efficiency of water use; promoting technological advancement, new high-yield seeds , including mechanization, to improving yields and productivity; improving the effectiveness of agricultural research and extension; support further improvements of the farm-to-market value chain and reduce spoilage; and improve markets and incentives related to agriculture through reforms of prices, trade, and subsidies. The vision of what India's economy in 2040 with an affluent and modern agricultural sector should and can look like, will require fundamental changes in both the demand and supply sides of Indian agriculture.

Narain,Shanna&Bhatia(2002) in their paper had estimated the level of development of various districts of Madhya Pradesh. Technique of composite index was used to estimate the level of development separately for agriculture, industrial, infrastructure and socio-economic field. 45 districts were selected and each district was taken as a unit of analysis. The study was carried out for the year1994-95 on 47 indicators. Coefficient of variation and statistical technique given by Narain et al.were applied to construct composite index. Wide disparities

in the level of development at state level were found. Infrastructural facilities were found to have positive association with the development of state.

Varma(2004) in his study analysed inter-regional economic inequalities in Rajasthan with the objective to measure inter-district inequalities prevalent in various sectors of the economy and livelihood. For this purpose this study selected 97 indicators pertaining to 12 sectors. On the basis of the nature of development, 32 districts of the state were ranked by using simple weighted average. First ranking was done for each sector and then a composite rank for all the indicators were assigned to each district in the study. Moreover in this study districts were also ranked on the basis of allocation of plan outlays over the period 1993-2001.Results of the study revealed that there was difference in allocated funds to developed and backward districts. Highly developed districts were allocated more funds than the extremely backward districts. The study ranked districts as extremely developed(ED), highly developed (HD), developed ones, average and backward districts on the basis of weighted average. The districts with weighted average of above 70 were ranked as ED. Jaipur was ranked at the highest in this category followed by Ajmer, Jodhpur and Kota. The districts with weighted average between 50-70 were ranked as 'medium level of development'; Jhunjhunun, Ganganagar, Alwar and Sikar were ranked in this category. Pali, Bikaner, Bhilwara and Nagaur were categorized as 'developed' ones. Districts with 'moderate development' came out to be Udaipur, Hanumangarh, Churu and Bharatpur. The 'average' districts, according to this study were Chittoregarh, Rajsamand, Sirohi and Tonk. The scores of 'backward' districts were very low in almost all the sectors. In this category districts were Jaisalmer, Dhaulpur, Karauli, Sawai Madhopur, Jalore, Banswara,Dungarpur, Barmer, Bundi, Dausa, Jhalawar and Baran. The study suggested that better planning, deliberate policies and Road

Map based on sectoral plans prepared for districts were required to remove inter-district inequalities. A number of measures had been suggested to reduce inter-district inequalities. A model had been suggested based on the assumption that 60 per cent of the fund allocation would be allotted for meeting out the committed expenditure and state level programmes and remaining 40 per cent could be made available to the district. The study also suggested other measures to reduce inter-regional inequalities prevalent in various sectors of the economy.

Pardey, Julian & Roley (2006) in their book analyzed the importance of R&D in agriculture in developing countries. The world's agricultural economy was transformed remarkably during the 20th century and in this increasingly interdependent world, both rich and poor countries have depended on agricultural research conducted in the private and public laboratories of these few countries, even if they have not contributed to financing the activity. The book thrown light on the fact that Brazil, China and India -the three largest developing countries in the world are making transition, but yet the investment in agricultural research and development in these countries fall short of the requirement and to overcome this chronic problem of underinvestment in agriculture research and development these countries need to increase investment in these sectors. The book had also shown that rich countries are now no longer interested in simple productivity enhancement rather as income increases dietary patterns and other priorities change, so the research agendas of the rich countries also shifted from emphasis on enhancing the production of staple foods to an increasing emphasis on enhancing certain attributes of food (such as growing demand for processed and so-called functional foods) and on food production systems (such as organic farming, humane livestock production systems, localized food sources, and "fair trade" coffee). Food-security concerns are still pervasive in the poor countries. Certain

suggestions have been documented to change pattern of investments in agricultural R&D in less-developed countries.

Shenggen, Gulati & Thorat (2007) in their book reviewed the trends in government subsidies and investments expenditure on Indian agriculture by government and had shown the impact of these expenditures on agricultural growth and poverty reduction in India. The authors had suggested several reform options with regard to re-prioritizing government spending and improving institutions and governance. The major findings of the book were that to make small farmers adopt new technologies initial subsidies in credit, fertilizer, and irrigation are crucial, because of the reason that small farms are often losers in the initial adoption stage of a new technology reason being that the agricultural products prices are typically being pushed down by greater supply of products from large farms which adopted the new technology. But results had also shown that continued subsidies had led to inefficiency in the overall economy. The book had also shown the three most important areas - agricultural research, education, and rural roads of effective public spending which had helped in promoting agricultural growth and poverty reduction during all periods. The results of the study had shown that investment in agricultural research, education, and infrastructure had large growth impact and a large poverty reduction impact. Expenditure on agricultural input and output subsidies was proved to be financially unsustainable, environmentally unfriendly and unproductive which had contributed to increase inequality among rural Indian states. The book suggested that the government should cut subsidies of fertilizer, power, irrigation, and credit to provide a long-term solution to poverty reduction and to sustain long-term growth in agricultural production. Investments should be increased in agricultural research and development, rural infrastructure, and education.

EPW Report (2008) discussed the prevailing disparities at state, inter-state and intra-state level and challenges imposed on agriculture sector in terms availability of finance. State-wise analysis revealed that a substantial proportion of farmers wanted to leave farming profession as now it is no longer profitable. Inter-regional disparities had further widened and ground level credit shares of central or eastern region had either declined or stagnated, in spite of increase in state income share of almost all underdeveloped regions between 1993-94/1995-96 averages and 2002-03/2004-05 averages. A number of measures have been suggested to meet the target of 'Financial Inclusion'.

Bhalla & Singh (2009) in their research article had thrown light on the changes in Indian agriculture in terms of crop yields and total agriculture output in post economic liberalization period(1990-93 to 2003-06) and compared it with pre-reform period(1980-83 to 1990-93).To support the study the authors had studied detailed data for 281 districts of India and provided district-wise analysis on agricultural growth in India from the beginning of liberalization to the period of slowdown in agriculture and rising farmer distress. The results of the study shows that there was deceleration in the growth rate in crop yields as well as total agriculture output in most of the states in India in post-reform period .The authors had used the econometric techniques and statistical measures to analyze significant issues related to agriculture in India. The paper discussed changes in cropping pattern that have taken place in area allocation as well as in terms of value of output. The results of the study had shown that slowdown in the process of cropping pattern change meant that most government efforts to diversify agriculture have failed to take off.

Reddy (2010) in his paper examined how regional disparities in A.P. had increased since its inception and had suggested policy intervention to reduce these

disparities. The author had used Gini-concentration ratio's (GCRs) to calculate agricultural production of two crops paddy and legume at district level and gross irrigated area (GIA). Results had shown the Gini Ratio increased for GIA showing that the benefits from land improvement/irrigation were increasingly concentrated in a few districts. The author suggested that different districts of the state are geographically not similar so there is need for different policy interventions accordingly.

Bhalla & Singh (2010) carried out this study with a view to analyse the regional patterns of levels and growth of agricultural output, productivity per agriculture worker at district, state and regional levels. This report had used techniques like cumulative frequency, Lorenz curve and econometric model to analyse the disparities. This study was conducted to analyse the impact of new seed-cum-fertilizer technology from 1990-93 to 2003-06 with special emphasis on 1991 since if followed the introduction of economic reforms in India. The results of the study had shown that prior to liberlisation Indian agriculture was protected from the world competition and a huge amount of subsidies and various tariff concessions were provided to promote private investment. After liberlisation in 1991,though no direct reference was made to agriculture sector, but changes in macroeconomic policy, exchange rate and trade policy, devaluation of the currency, reduction of tariffs and reform of public enterprises put the agriculture sector in a tight corner. The net effect thus was agriculture sector had negative protection and was discriminated against.

The study covered 17 major states, 46 crops, 288 composite district units by combing 420 districts. The study concluded inter-district disparities increased during 60s, come down during 70s, 80s and a rapid reduction during 90s. Based on the technique of regression analysis, the study had shown that inter-district

differentials in agriculture development are statistically significant. Increasing land productivity to compensate the declining farm family income due to squeezing of their land holding size was provided as a solution.

Hariharan and Saravanan (2010) in their article had analysed the inter-state variations in the growth of agricultural output in India under the WTO regime. This article was based on times series data (total 22 years) and a comparison was made in different states (31 states) of India prior and after implementation of AOA. Regression coefficients of the simple linear regression model had been used. The results had shown that agriculture sector in India had not gain much from the reform process and globalization policies. Compound growth rates of agriculture output in different states had shown decline from first period (1984-85 to 1994-95, 11 years prior to establishment of WTO) to second period (1995-96 to 2005-06, 11 years after the establishment of WTO).With respect to Rajasthan this paper had shown that CGR for agriculture output has declined from 6.39 in first period to 0.60 in second period.

Birtha, Singh & Kumar (2011) in their paper have investigated the accelerated economic growth among major India states during the period of economic liberalization (1980/81–2004/05) and also analyzed the factors that enhanced economic growth in these states and lead these states towards an identical steady state. Results indicated that there was absolute divergence in income levels across states. The paper suggested that investment in physical infrastructure and human capital alone were not sufficient, rather investment it these sectors should be accompanied by a reduction in employment pressure on agriculture by improving labour market linkages of agriculture with non-agricultural sectors to enhance economic growth, and by promoting growth-enhancing labour-intensive agricultural technologies.

Chand & Raju(2011) had studied instability and regional variation in Indian agriculture in their policy paper. The major reason found for persistence of regional disparities in agriculture and farm income were uneven effect of modifications in technologies and formulation of some government policies. To support their study they used mean, standard deviation and coefficient of variation. This instability in yield of foodgrains had exceeded 20 per cent in Rajasthan**,** Gujarat, Maharashtra and Orissa in both the periods. Access to irrigation was found to be the main factor for inter-state variations in instability in area, production and yield. The results of the study found that impact of new crop technologies and policies adopted during different periods since 1951 to reduce variations in production and resulting risk had been lacking. The paper suggested that there was a need for addressing risks in farm income by devising area-specific insurance and some other suitable mechanisms.

Raman& Kumari (2012) in their paper analyzed district and regional level disparity in agriculture development in the state of Uttar Pradesh using 13 agricultural development indicators with the help of UNDP based methodology. Relative variations and changes in ranks of different districts have been computed through composite index for two cross-section years 1990-91 and 2008-09. Results of the paper had shown existence of high and persistent inter-state disparity in agriculture in the state over the years. Development of agriculture in western region followed by central region remained polarised and there was least development in Bundelkhand region over the periods of 1990-91 to 2008-09.Moreover the paper evidenced that maximum number of districts located in western and central have scored best record where agriculture was commercialised, technology was also advanced. Three suggestions had been provided in this paper for the problem of inter-state disparities – to develop region specific policies, to

develop a mechanism that ensures credit and subsidy to the neediest regions, and need to identify the agro-climatic zones that have problems. The paper also suggested that to make development process truly inclusive a more determined, effort on the part of the policy makers was needed.

Andrabi and Khan(2013) The main objective of this paper was to account for the differences in the level of agricultural development at district level. The authors had used 'Z-score' technique, selected seven variables of agricultural development and ranked the districts according to their level of development. CSS-Composite Standard Scores were aggregated to find the disparity in agriculture development in Kashmir valley.

Kumar & Jain(2013) in their study threw light on trends in growth and instability in Indian agriculture at district level. The paper calculated average crop productivity different category of districts- very low, low, average, high, very high. The paper suggested that large scale stabilization measures like insurance should be promoted to mitigate the consequences of persisting instability. Moreover, the paper emphasized the importance of modern technology and prudent management of rainfall water.

Tripathy&Umakanta(2013) focused on inter-district disparities in the development across different districts in the state of Orissa in their paper. A comparison was made at two points of time 1980-81and 2000-01. On the basis of findings the different districts were categorized as very backward, backward, developing, developed category. The paper had used log linear function to find out growth rate of different indicators of development. The paper suggested the state government should empower state Finance Commission to make assessment of the

requirements of different districts according to their level of development and thus meeting the objective of reducing disparities at state level.

Mukherji, Stuti &Shah (2013) in their paper emphasized on wide regional variations in the country's groundwater economy and have suggested that there is a need to craft management strategies accordingly. The paper also pointed out slow down in India's groundwater economy since 2000-01 on the basis of data from the four minor irrigation censuses conducted by the Ministry of Water Resources between 1986-87 and 2006-07.According to planning commission report in 2007, there were 1610 critical and semi-critical blocks of which 85% was in nine states-Rajasthan was one of them. Power shortage was found to be the major reason for under utilization of groundwater schemes since 1980s. About ownership pattern the paper disclosed that things have not changed over time and 90% of all groundwater structures are owned by private individual farmers. The steps taken by West-Bengal to change the Ground –Water Act 2005, will make it easier for small and marginal farmers to invest in wells and tube-wells.

Mkhize(2013) in their paper had made a comparison between structural transformation in India and China. The results of the paper had shown that in India share of agriculture sector in GDP has declined but with a larger portion of population still dependant on this sector. Whereas in China, agricultural share in GDP has been declining faster too, but so has its share in employment. This was found to be one of the important reasons for structural transformation in China. India was found to be still far away from a turning point in its structural transformation. The paper also discussed rising feminization in agriculture sector, and had thrown light on issues like - farm sizes will continue to decline, part time farming will become the dominant farm model.

Shafiqullah (2013) in his analyzed the spatial patterns of disparities and the levels of agricultural developments in the state of Uttar Pradesh. The results of the study had shown that agricultural development in the north-eastern and southern districts had given signs of backwardness in the light of selected variables and the western and central plain districts had given the impression of being in a higher side of the scale of development. The article recommended that there was tremendous scope for development in the agricultural sector in this state. Sufficient land was available in the state which could be brought under cultivation and by increasing irrigation facilities, gross crop area could have been increased considerably. The study suggested that districts having low level of regional development should be given top priority so that they could come up at par with developed areas, and the concept of planning with social justice may be fulfilled.

Ghosh (2013) in his book offered extensive information and in-depth analysis of issues related to agriculture, industry and service sector in India. This book has evaluated the performance of agricultural production and the impact of agricultural reforms on spatial integration of food grain markets. This book has also focused on issues related to regional disparities during post-reform and pre-reform period. In field of agriculture this book raised the issue of inequality in income originated from agriculture sector in India. Advanced econometric methods have been used to approach the various issues pertaining to India.

Objectives

1. To prepare a composite index of agricultural development for the districts of Rajasthan on the basis of selected indicators.
2. To rank the districts in order of their agricultural development on the basis of their respective composite index scores; and categorize them under three levels of agricultural development, viz, Highly Developed, Moderately Developed and Under Developed.
3. To analyze the degree of inter-district disparities in the levels of agricultural development in Rajasthan at two points of time (1990-91 and 2010-11).
4. To examine the variation in inter-district disparities in Rajasthan over the period under study and attempt to explore the reasons thereof.
5. To analyze the impact of state policies on growth and development of agriculture sector in the state of Rajasthan.
6. To suggest measures to promote a balanced agricultural development in the state of Rajasthan.

Hypotheses

H0: there is NO difference in the 'level of inter-district disparities in agricultural development of Rajasthan' when measured at two points of time viz. 1990-91and 2010-11.

H1: there IS a difference in the 'level of inter-district disparities in agricultural development of Rajasthan' when measured at two points of time viz. 1990-91and 2010-11.

Data and Methodology

Coverage: The proposed study will cover all the 33 districts of the state of Rajasthan. The study will attempt to analyze the extent of variations among different districts of Rajasthan from 1980 to 2010.

Data: The study is based on secondary data primarily drawn from the 'Statistical Abstract of Rajasthan' and 'District Outlines' published annually by the Directorate of Economics and Statistics (DES), Government of Rajasthan, Jaipur. The other sources are Census reports, reports on Economic Census, and annual publications by DES on Agricultural Statistics.

Indicators: The indicators selected to represent the level of '**Agricultural Productivity**' are:

1. Per-capita Food-grain Production (PCFP)
2. Per-capita Non Food-grain Production(PCNFP)
3. Percentage of Area Under Commercial Crops to Gross Sown Area (PCCGSA)
4. Percentage of Area Under Cash Crops to Gross Sown Area (PCACGSA)
5. Percentage of Area Under oilseeds crops to Gross Sown Area (POCGSA)
6. Percentage of Area Under pulses production to Gross Sown Area (PPCGSA)
7. Percentage of Area Under other Crops to Gross Sown Area (POCGSA)
8. Cropping Intensity (CI)
9. Cropping intensity for gross irrigated area(CIGIA)
10. Average price of agriculture commodities(APAC)
11. Value of per hectare agricultural production ('00 Rs) (VPHAP)
12. Average productivity of agriculture worker(APW)

The indicators selected to represent the level of '**Agriculture Infrastructure Development**' are:

1. Percentage of net area irrigated to net area sown(PIAS)
2. Percentage of Net Area Sown to Cultivable Land (PNASCL)
3. Percentage of Gross Area irrigated through wells ,tubewells and diseal pumpsets(PGIAWTP)
4. Percentage of Electrified wells and tubewells to total number of wells and tubewells.(PEWT)
5. Availability of Gross Area Sown per Tractor (AGAST)
6. Distribution of Total Fertilizer per Hectare of Gross Area Sown (DTFGAS)
7. Number of Krishi Upaz Mandis per Lakh of Population (NKUM)
8. Percentage of Total Electricity Consumption in Agriculture Sector (PECASTE)
9. District-wise Percentage Distribution of Private Pumping Sets/Tube wells (DPDPPT)
10. District-wise Percentage Distribution of Government Tube wells (DPDGT)
11. District-wise Seed and seed replacement rate(DSSRR)
12. District-wise Quality control laboratories(DQCL)
13. Number of electric pumpsets (per 1000 ha. of area sown) (EP)
14. Number of tractors (per 10,000 ha. net area sown)(NT)
15. Electricity consumption in agriculture sector (per person in kwlhour) (ECAS)
16. District- wise Percentage of Rainfall to total State Rainfall(PRSR)
17. District-wise Level of Groundwater(DWLG)

The indicators selected to represent '**Government Expenditure on Agricultural Development**' are

1. Percentage of Government Expenditure on Agriculture Research and Development to total Agriculture Expenditure(PAERDTE)
2. Percentage of Agriculture Expenditure on Agriculture training and research centre (PAETR)
3. Percentage of Government Agriculture University to total Agriculture Universities(PAUTU)
4. District-wise Total Subsidy Expenditure on Agriculture Development(DSAD)

Methodology: The technique of Principal Component Analysis (PCA) will be used in order to prepare composite indices of agricultural development for the districts of Rajasthan at three points of time-1980-81, 1990-91 and 2010-11.

Districts will be ranked in order of their agricultural development on the basis of their respective composite index scores; and will be categorized under three levels of agricultural development, viz, Highly Developed, Moderately Developed and Under Developed.

In order to measure the extent of inter-district disparities, statistical techniques of standard Deviation, Coefficient of Variation, Gini coefficient and Lorenz curve will be used.

Chapter Scheme

The proposed study will be organized in the following chapters:

1. Introduction
2. Rajasthan and Its Districts: A Profile
3. Agricultural Productivity in Rajasthan: A District Wise Analysis
4. Agricultural Infrastructure Development in Rajasthan: A District Wise Analysis
5. Government Expenditure on Agricultural Development in Rajasthan : A District Wise Analysis
6. Overall Agricultural Development in Rajasthan: A District Wise Analysis
7. Regional Disparities in Agricultural Development of Rajasthan: An Inter-District Analysis
8. Government Policies and Measure: A Critical Analysis
9. Suggestions and Conclusions

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